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Notes on the Common Tortoise

EDITED BY

OLIVER GRAHAM-JONES

Zoological Society of London

I.—The Trade in Tortoises

BY

F. JEAN VINTER

Universities Federation for Animal Welfare

AND

MONICA GREEN

British Herpetological Society

Introduction

THE tortoise most commonly imported into this country is the spur-thighed Mediterranean tortoise (*Testudo graeca*) which comes from Morocco. A smaller number of Hermann tortoises have been imported during recent years from the Balkans. Though Hermann tortoises are hardier than spur-thighed tortoises they are not imported in large numbers because they are not available as early in the season as the Moroccan tortoises and importers find them more expensive.

Spur-thighed tortoises are exported by 3 firms in Casablanca and 80 to 90 per cent. of the total export comes to Britain. During 1958, 51 tons of spur-thighed tortoises were imported from Morocco, during 1959 88 tons, and during 1960 80 tons. There are about 3,000 tortoises per ton, giving a total number imported annually of approximately a quarter of a million. All are imported for the pet trade.

Since 1953 an export limit of 100 tons has been enforced in Morocco, but even so the tortoise population in Morocco is falling appreciably.

Catching, Shipping and Distribution

In Morocco, tortoises come out of hibernation in February and March, and subsequently they are collected in the wild by country boys who may keep them tethered by the leg. They are eventually taken in sacks by lorry to collecting centres where as far as possible they are "deticked," packed closely in deep baskets (which hold about 60 animals), and shipped as deck cargo to the Port of London, the sea journey taking about 8 days. In general the baskets are correctly placed (right way up) on board ship and on the quay side. Shipment begins in March and goes on until August. With few exceptions the importers collect tortoises promptly from the docks.

General Notes

During the 1959 and 1960 seasons random baskets of tortoises were examined at London Docks and at importers' premises by 2 herpetologists, Monica Green and Alfred Leutscher; baskets dispatched by the 3 exporters from Casablanca were seen. The mortality rate of the tortoises between Morocco and London was found to be approximately 1 per cent. It is evident, therefore, that the baskets now used are satisfactory and that the animals can survive the 3 weeks of close confinement which may occur between packing and unpacking. It was found, however, that 40 per cent. of the tortoises imported were immature, immaturity being judged somewhat arbitrarily by the length of the plastron (under-shell). If the plastron measures less than 4 inches (10 cm.) in length the tortoise can be considered to be immature and less viable than a mature animal. On arrival in this country tortoises distributed by importers to retailers by rail must be repacked in shallow wooden boxes since British Railways do not accept tortoises in baskets. If tortoises are distributed to retailers by road there is no control over the type of container used and they are sent out in their original baskets.

As soon as tortoises reach the retailer they should be removed from their containers, cleaned and, if possible, given a drink (or bath ?) of warm water. In order to drink, a tortoise must have water deep enough for it to submerge its head. No further watering will then be required until the animal arrives at its final destination. The retailer may have to keep a large number of tortoises together in a small box until they are sold, and under these conditions it is better to supply water by feeding lettuce leaves which have been dipped in water. Prior to sale tortoises must have shaded areas away from sunlight, and protection from frost at night. When tortoises are put

into a shop window, care must be taken to see that the sun does not constantly shine directly on them. The cage floor should be frequently cleaned. Clean newspaper is the best floor material to use since it can readily be removed and burned ; sawdust and sand tend to adhere to the food and may be eaten. No tortoise should be hung up in a bag or basket, nor should it be packed in a polythene bag at the time of sale.

It is probable that only about 1 per cent. of the tortoises imported into this country survive their first year here. One main, though indirect, cause of death is immaturity, and attempts are now being made to curtail the import of immature animals. Tortoise owners need intensive education in the husbandry, fencing in, protection and feeding of their pets. Many humane societies provide suitable literature, and U.F.A.W., 7a, Lamb's Conduit Passage, London, W.C.1, also lends free of charge a 16-mm. film, " The Tortoise in Exile."

II.—Biology of the Common Pet Tortoise Kept in Britain

BY

ALFRED LEUTSCHER

Reptile Adviser to U.F.A.W.

Some knowledge of the anatomy and general natural history of an animal is always a help towards a better understanding of its habits and adaptation to the wild home in which it lives. It follows that this can also apply to its proper care in captivity, in surroundings often foreign to its nature.

Classification and Taxonomy

Tortoises are vertebrate animals belonging to the class *Reptilia*, the order *Chelonia* (tortoises, turtles and terrapins), and the family *Testudinidae*. The generic position is in *Testudo*. They vary in size from the giant tortoises of certain tropical islands, to the pet tortoise of the Mediterranean region. Generic characters are the highly domed carapace, covered by shields of horn without sign of keels, stumpy elephantine limbs used for walking and digging, and a short blunt tail. The following are the two species most commonly imported into Britain as pets and both are loosely called " Greek " tortoises. The first is by far the commonest.

1. *Testudo graeca* Linne

Formerly called *Testudo ibera*. Characters : carapace highly domed, shields minus keels and with smooth margins. Nuchal shield narrow, fifth neural shield broad, post marginal shield (supracaudal) without dividing suture. Plastron notched behind. Scales on fore-limbs large and imbricated, in 4 to 5 longitudinal rows. A horny conicle tubercle behind each thigh. Older specimens show movement in anterior part of plastron, as if on a hinge, and hind marginals on carapace tend to grow out into a " skirt." Tail is minus a spur. Adult length of plastron up to 25 cm. Colour : carapace yellowish to olive with blackish borders to the plates and a large central black patch. Patches may also occur on the marginal shields.

Distribution. The typical sub-species *T. graeca graeca* occurs in N. Africa, from Morocco to Cyrenaica, south Spain and the Pityusen islands. The northern race *T. graeca ibera* is found in Iran, N. Mesopotamia, the Caucasus, the eastern Balkans, lower Danube, Asia Minor and Israel. It is somewhat darker, with broader and flatter plates, and a more pronounced " skirt." Popular names are the Algerian, Moroccan, Iberian, " Greek," Moorish, Mediterranean and Spur-thighed tortoise.

2. *Testudo hermanni* Gmelin

Formerly called *Testudo graeca*. Character : similar to *T. graeca* but with the following differences : fifth neural shield much smaller, post marginal divided, scales of fore-limbs much smaller, in 6 to 10 longitudinal rows. There is *no* tubercle behind the thigh but, instead, a horny spur on tip of tail. Less tendency for hinder marginal to form a " skirt." Colour is much lighter, even bright yellow or lemon-orange in some animals, with a dark central patch and border to each dorsal and marginal shield. A dark border to the plastron. Soft parts a grey-brown.

Distribution. The home of the typical sub-species is the Balkans, either in woodland or on mountains up to 700 m., also in parts of Italy, Sicily and possibly Corsica. A western sub-species *T. hermanni robertmertensi*, with more highly domed carapace, brighter coloured yellow and sharply contrasting dark parts, has been described for Sardinia, the Balearic Islands and Spain. In southern France it may be an introduction.

Anatomy

The Exoskeleton

The box-like bony shell is composed of an upper carapace and a ventral plastron, fused together along the sides, and composed of bony plates laid down in a definite pattern. A further series of visible horny shields of epidermal origin grows over this but does not correspond in number or position. The shield pattern is an aid to identification in tortoises, and in the genus *Testudo* consists of : carapace—a central row of 5 large, neural or vertebral shields, with a narrow anterior nuchal shield and a posterior pygal or supracaudal shield ; 4 lateral or costal shields along each side of the neurals ; 11 smaller marginal shields bordering the carapace down each side, making 22 in all but excluding the nuchal and pygal. Plastron —a series of 6 pairs of shields named successively from front to rear the gular, humeral, pectoral, abdominal (largest), femoral and anal shields.

There are also a few small axillary and inguinal shields joining the carapace to the plastron.

Internal Skeleton

The skull is of the Anapsid pattern, being devoid of any temporal vacuities (*i.e.* a more solid structure than in most other reptiles). There is, however, drastic reduction in the axial skeleton which has a shorter backbone than in other reptiles. All but the

first 10 trunk vertebrae are fully fused to the neural shields and the dorsal ribs to the costal shields. There is no sternum. The limb girdles are unusually situated and lie partly inside the rib cage.

The Head

The head is narrow anteriorly, broad behind the eyes, then narrows into the neck which passes gradually into the body. The neck vertebrae are flexed vertically on withdrawal of the head. (This pumping action assists in breathing, producing a hissing sound with sudden movement.) The tympanum is indistinct, and the dark, olive-brown eyes have movable eyelids and nictitating membrane. The tongue is non-protrusible and strongly covered with taste buds. There are no teeth, but the jaw bones are covered with a horny epidermal beak used in biting through plants. Note : respiration is assisted by movements of the fore-limbs, the hyoid apparatus, and by diaphragmatic movements.

Limbs

The 4 legs are stumpy and elephantine in shape and based on the normal pentadactyl arrangement of vertebrate limb bones. The short toes terminate in 5 digging claws in the front foot and 4 in the hind foot.

Tail

This is short in *Testudo*, ending in a point, with or without a spur according to the species.

Internal Organs

Because of limited space rigidly imposed by the shell the internal organs are somewhat cramped. The much coiled and extensive alimentary canal consists of a short aesophagus with many internal folds of mucous membrane, passing into the first or cardiac stomach which lies below, and in a depression of, the liver, followed by a narrow pyloric stomach. Pyloric valves control the passage of food into the duodenum, which continues as the lengthy small intestine. The small intestine enters the bag-like caecum which in turn opens into the large intestine or colon. The rectum, together with the urinogenital sinus, enters the cloaca, a common exit for food waste, urine and genital products.

Liver

The liver is extensive, lying above the heart and consists of a large left and smaller right lobe separated by a small median lobe.

Heart

The tortoise has the typical reptilian heart consisting of 2 auricles and a ventricle incompletely divided by a transverse septum. There is a certain admixture of arterial and venous blood. Pulsation is sluggish with an average heart-beat of about 25 per minute.

Urinogenitals

A pair of orange-red ovaries with white oviducts lead into the common urinogenital sinus in the female. The male has a pair of long, oval yellowish testes attached ventrally to the kidneys whose ducts, the vasa deferentia, also open into the common sinus.

Lungs

These are extensive, situated mainly along the dorsal side just below the carapace, and arched over the heart and food chambers. The bronchi extend along the inner margins of each half.

Brain

The poorly developed cerebral cortex suggests a low intellect. There are well-developed olfactory lobes and optic chiasma.

General Description and Habits

It is not generally realised that the common pet tortoise kept in Britain is not a domesticated animal but a wild one. Most specimens come from the coastal lands of the Mediterranean. Here the tortoise lives in rocky or wooded surroundings, even in semi-desert scrub, under conditions of sharp contrast to an English garden. From a Mediterranean region of hot, dry summers and mild winters, this exile has to face an Atlantic climate of indifferent and often wet summers, and prolonged cold winters often with sharp frosts. It is not surprising, therefore, that great numbers live but a short while, unless given proper care and protection.

The pet tortoise is by nature terrestrial, diurnal, vegetarian and winter sleeping. It is slow and cautious, and movement is at best a clumsy walk with typical locomotory sequence of a quadruped, namely, left fore-foot, right-hind, right-fore and left-hind, the awkward legs being rotated through an arc. Even so, fairly high speeds can be reached, and the powerful legs are also used in digging (when egg-laying or hibernating) and for climbing over rough ground. On its back the animal is helpless, and in deep water may sink readily, being a poor swimmer. Shallow water, however, may be entered for taking a bath.

Being a reptile and therefore cold blooded or poikilothermous, *i.e.* " of changing heat," there is little control of body heat, as in birds and mammals. Much of the warmth is taken in from the surroundings and as readily lost. In prolonged cold spells hibernation is the rule. This slow physiological change cannot be hurried or interrupted without harm to the animal. During hibernation feeding ceases and in the wild a tortoise usually burrows in the soil or leaf litter, or beneath a convenient rock, in such a way that it is below the frost line. It also retires at night and during inclement weather. Aestivation (" summer sleep ") may occur in very hot weather.

Food in the wild is perhaps entirely vegetarian, taken by cropping succulent herbs and low-growing perennials, fallen fruits, etc., with allegedly incidental animal life such as snails, worms and slow-moving animals, also carrion. Water is drunk, usually in quantity over long intervals, and stored in the large bladder.

Eyesight is moderate and there is colour discrimination, often indicated in the approach towards objects of similar colour, whether edible or not. Yellow seems an attraction. There is some reaction to sound. Smell and taste are good and used to identify food and objects.

Although not intelligent by mammal standards, a tortoise is one of the more responsive of reptiles, and

will display surprising feats of memory and recognition of places and faces. Orientation is good, and patterns of movement from one place to another become habit forming. Sensitivity to touch, warmth and cold is strong. Much of the above has been observed in pet tortoises, but there is some evidence from wild specimens that tortoises have a territorial sense, and observe some kind of ritual in their apparently aimless wanderings, which may be part of a breeding pattern.

Courtship is clumsy and there may be some fighting between males, which bite one another. A male will approach and butt the flanks of a female with his shell, making quite audible thumps, followed by a strenuous and awkward mounting from behind. The tails are applied at the cloacal region beneath the carapace of the female. In specimens of 4 inches or more, aged about 3 to 4 years and above, it is possible to sex a tortoise : the male has a longer and thicker tail, with cloacal aperture placed beyond the carapace (nearer the tail base in the female), the plastron is hollowed in the rear half (flat in the female), and the post-marginal area (supracaudal) is curved and more hooked (flat in the female). The hind shell opening is larger in the male. Eggs, from about 4 to 12 according to age, are laid at any time during the warmer season after digging a hole in the ground with the hind feet in which the eggs are placed and covered over. The soil or leaf mould of the nest site may be wetted and packed down by urine from the mother. Storing of sperm by the female may ensure a fertile clutch as long as a year or more after mating. Incubation lasts about 10 weeks. There is no parental care, and the young fend for themselves. Natural enemies are few, apart from bacteria and ticks, and certain birds of prey which carry the victim aloft, then drop it to smash on the rocks. At first timid, the tortoise readily adjusts to domestication and this may lead to misunderstanding. Uncomplaining by nature, largely voiceless and long suffering, it can easily decline in health at the hand of an inexperienced owner. Long to live yet slow to die, a tortoise is equally difficult to cure when ill.

To say of the quarter million or so tortoises which are imported annually, that most of them will be dead within the year—the combined result of a change in environment, commercial hazards, improper feeding, indifference, ignorance, even cruelty—is excellent reason for promoting a proper sympathy and understanding among all peoples who have anything to do with the tortoise as a pet.

III.—Land Tortoises

Buying, Housing, Feeding and General Care

BY

MAXWELL KNIGHT

Camberley, Surrey

Buying

The following remarks should be borne in mind when purchasing a tortoise.

1. First watch the tortoises displayed and note those which are feeding or moving about. Pick up the most active one and test its reactions by touching it lightly on the snout. It is a good sign if it withdraws quickly into its shell, and the animal is worth further inspection.

2. Scratch the tortoise on the under part of the shell (the plastron) which will usually stimulate it to emerge again. Examine the eyes and check that they are fully open and bright. Examine the mouth to find out if the " lips " are free from discharges—if the tortoise has been observed feeding its mouth is probably in good condition.

3. The shell should now be scrutinised ; any chips or cracks suggest that the particular individual should be rejected. If the shell is perfect, the skin under the chin, round the neck region, and the legs should be inspected. Ticks may be seen which need not necessarily mean discarding the specimen, but which will have to be removed in due course.

4. Finally, weigh the tortoise in the hand to find out if it appears " light " for its size ; if it does, then reject it. It is advisable to have a general survey of the tortoises and their cage. If a number have been eating, then faecal droppings should be visible. Firm and well-formed droppings indicate that the digestion of those which have excreted are functioning normally. If the motions are soft or even fluid, then it is better to purchase elsewhere.

Housing and General Care

This will depend to some extent upon whether the animal is to live in a flat, a house with a small garden, or one with an extensive garden. If you have no alternative it is quite possible, though not desirable, to keep a tortoise in a flat providing it is very carefully tended and kept clean. It must have a large box in which to spend most of its time, and the box should not be less than 4 ft. long and 2 ft. wide. Eighteen inches in height is enough but the box must be covered with wire netting to protect it from dog or cat and also to prevent escape—for tortoises can climb better than is realised. The box should have several sheets of newspaper on the floor ; this is more absorbent than straw and is much more easily changed daily.

The room in which a tortoise is kept must be warm —approximately 60° F.—and the animal should be able to exercise daily. If kept in a flat a tortoise cannot fend for itself and is entirely dependent upon food provided for it.

Many owners who have a garden allow their tortoises " free range," when they can roam where they like. Two disadvantages of the open range system are (1) that the tortoise may be difficult to find, and (2) that the tortoise may eat seedlings. The animal should never be kept in an unfenced garden.

Perhaps the best way to keep a tortoise in a garden is to have a movable " run " such as is used for young chickens but on a larger scale. This run should be not less than 8 ft. long, 3 ft. wide and 2 ft. in height. The run will also require a box properly waterproofed, and measuring not less than 18 inches in all 3 dimensions. This box should be placed on its side with the open side towards the end of the run and its back placed against the corner. This will serve as a retreat in

damp or cold weather. The run and box should be placed on a lawn, or in rough grass, or even on a waste patch where there are weeds. It must be moved each day so that the ground does not become foul or surplus-food dirty. The run should be in a sunny, sheltered site because tortoises depend upon warmth for many of their activities.

"Tethering" of tortoises is most undesirable. This method involves drilling a hole in the edge of the carapace and fastening a cord through it, the other end of which is secured to a peg in the ground. Injury to the reptile can be caused by drilling and friction of the cord. Also, a tortoise travels in straight lines, and if tethered never gets the benefit of a wide feeding area. There is a risk that, when it gets to the end of the cord's length, it may struggle and fall on its back ; this causes discomfort and may produce injury and even death.

Food

North African tortoises are vegetarian. They do not, therefore, rid gardens of slugs and beetles as is popularly believed. Whether the animal is kept in a flat or in a garden it will require the same kind of food, though one living indoors must be certain of getting really fresh vegetation, not wilted food that has lost its moisture. The quantity of food will depend on the size of the tortoise and the temperature at which it is kept. It has been calculated that one whole lettuce per day is sufficient for a tortoise, but this is an expensive way of feeding one and there are a variety of foods which are suitable. The outside leaves of lettuces used in the house will be relished, but in addition the following may be given : fresh clover, plantain, dandelion, watercress, pea-pods and the stems and leaves of peas which have been cropped ; hog-weed, young cabbage leaves, sprouts and broccoli. In addition, segments of tomato—especially for young tortoises ; soft fruit of many kinds ; and slices of apple.

The foregoing will maintain any tortoise in good condition. Avoid unnatural foods such as bread and milk. Tortoises may take this, but it can lead to digestive disturbances.

Tortoises are often reported as being seen nibbling at old bones, chalky stones, etc. ; this may be because they lack calcium. This lack may be catered for by supplying a piece of cuttle-fish bone, or a piece of soft *natural* chalk.

The question of drinking is often debated, but in captivity it is best to have water available. The dish should be deep enough for the tortoise to sink its head in the water but not so deep nor so big as to allow the tortoise to get into it and not be able to get out. A flat, shallow dish into which the animal can step is quite suitable. Where the tortoise is not in a pen the vessel may be sunk into the ground, and kept full and clean.

Hibernation

Except for those tortoises which have to be kept indoors all the time this natural function of hibernation during the cold months must be allowed. It is unsatisfactory to house a tortoise for the winter unless it has fed well and "feels heavy." From about the middle of October until the following April, in normal autumns and winters, tortoises should be put into a deep box filled with dry hay and leaves. This box should be placed in a shed, cellar, or outhouse where the temperature does not vary. The box should be covered on top with wire netting to keep out rats. Provided the tortoise has been well fed it should be left *undisturbed* until warm weather returns. In early spring, if the tortoise is seen to be active, it may be taken out on warm days but replaced at night until all danger of frost has gone.

IV.—Some Clinical Conditions Affecting the North African Tortoise ("Greek" Tortoise), *Testudo graeca*

BY

OLIVER GRAHAM-JONES

The Zoological Society of London

Introduction

Most of the diseases commonly affecting land tortoises in this country occur either during the 2 months following recovery from hibernation or during the first 6 months after importation. Some of the explanations for this are as follows :—

1. In the newly imported animal, difficulty is experienced over acclimatisation.
2. The animal may have had a poor hibernation in unsatisfactory conditions.
3. There may have been a broken hibernation due to variable weather conditions.
4. The animal may have been insufficiently protected against low temperatures during hibernation.
5. There may have been ill-advised feeding in warm weather periods during hibernation.

It is critical that a tortoise when entering hibernation should be allowed to do so in properly insulated surroundings, and left undisturbed at an even, low temperature, approximately 40° F. at its lowest.

Diseases of the Outer Integument

Early diagnosis of tortoise diseases is sometimes very difficult and accurate diagnosis frequently more so. *Post-mortem* findings are more revealing than clinical examinations and many of the conditions noted at *post mortem*, and described by Hunt (1957) do not reveal themselves until death.

1. *Diseases of the Skin*

Subcutaneous cysts. Small nodular cysts may occur subcutaneously anywhere on the skin of a tortoise, but chiefly in the region of the head and neck. In the latter site, they sometimes grow to such proportions that the animal is unable to protrude and withdraw its head satisfactorily. Stok (1955) describes epidermal cysts with cornification in *Testudo ibera* and likens them to atheroma cysts in man. Not all the cysts seen on the skin of a tortoise are so complex as those described by Stok, and are easily removed by making a small incision through the epidermis and

squeezing out the contents of the cyst, which are usually somewhat inspissated. Suturing of the incision is sometimes necessary.

Dog, cat and rat bites. Hibernating tortoises are sometimes discovered by dogs, cats or rats and attacked. Sometimes by the time this is discovered the wounds have become septic and necrotic. Surgical debridement and cleaning may be necessary, and the wounds may have to heal by slow granulation associated with daily bathing with normal saline. Whilst satisfactory healing normally occurs, in the warmer weather it is essential to guard against blowfly.

Maggot attack. In the warm weather blowflies will frequently oviposit in the region of the tail and cloaca. As the larvae hatch they will feed on the tissues and erode large areas extending up underneath the carapace unless prevented. Thorough washing of the area is required, with removal of all parasites. It is best to bathe the area twice daily and dress with an astringent antiseptic powder.

Ectoparasitism. The commonest ectoparasite seen is the tick which frequently arrives with the tortoise on importation. The ticks should be removed by applying a volatile anaesthetic (*e.g.* ether or chloroform) to them until they release their grip.

2. *Diseases of the Carapace and Plastron*

Traumatic injuries. The carapace and plastron are sometimes injured by motor cars, falling rocks, etc. There may be gross dislocation of vertebral and costal shields with haemorrhage from the underlying tissues and the marginal growing line. If still adherent to tissues, and treated within a few hours, it is possible to wire the dislocated shield back into place, using fine silver wire. Healing will be slow and the carapace or plastron may be distorted subsequently. If the shields have been dislodged for a period of time they are best removed and the soft area covered by an adhesive dressing. Regrowth of the shell in these cases will take many months, but the health of the animal need not suffer providing the area is kept free of infection.

Distorted, flaking or faulty shields. Sometimes tortoises are seen with dry flaky scales that are sloughing their outer cornified layers. In these cases it is not uncommon that infection, either bacterial or fungal, is introduced into the interstices between the flakes, causing further damage. The cause of this condition is not properly understood, but it may be associated with dehydration, or with lack of minerals in the diet. Treatment consists of the removal of the dried scaly material, and dressing the whole of the affected animal with a mineral oil daily. The administration of one drop of cod liver oil daily internally coupled with an absorbable calcium salt sprinkled on lettuce is advisable. Noel-Hume (1955) also recommends that the diseased scales should be removed but that the areas be dressed with strong iodine.

Diseases of the Eye

Diseases of the eye can occur spontaneously, or associated with a hot dry and dusty summer, but they should always be regarded in the first instance as indicative of generalised malnutrition and inanition. Brunner (1955) has described the use of sulphanilamide in the treatment of eye conditions, but it is felt by the writer that there are more efficacious drugs currently available ; similarly, a solution of boracic crystals is recommended for bathing the eyes by Noel-Hume (1955) who further suggests that a 5 per cent. solution of Protargol is useful as an eye drop.

Panophthalmitis. This condition is usually bilateral, and the tortoise is presented with closed eyes, and the lids may be obscured by a cheesy, caseous exudate. Removal of this exudate will reveal inflamed lids, and a concurrent conjunctivitis. The nictitating membrane is usually located across the cornea, and is moved with difficulty. The cornea itself will probably be keratitic and may be obscured by a plaque of inspissated cheesy material. In these cases it is necessary first of all to reveal the eye and remove any debris. An antibiotic wax should then be instilled under the nictitating membrane on to the cornea, twice daily. It is advisable to bathe both eyes with warm normal saline before instilling any medicament. Panophthalmitis may be associated with a deficiency of vitamin A.

Conjunctivitis. The tortoise will usually have sealed lids in this condition, but when they are parted it is clear that the inflammation is limited to the conjunctiva, and the eyeball and the nictitating membrane remain unaffected. Treatment consists in twice daily bathing with normal saline and the instillation of an astringent eye lotion. Hunt (1957) recommends the use of silver vitellin as an eye lotion for this condition.

Diseases of the Ear

Testudo graeca has, in common with all tortoises, no external ear. Its auditory canal is closed by the tympanum. In some cases the auditory canal becomes blocked during hibernation with a thick inspissated sebaceous material. As the canal fills up, the ear plate bulges externally. If the pressure of the material is sufficient, it will track subcutaneously posteriorly and ventrally and will eventually prevent the animal from withdrawing its head into its shell. It is necessary to remove this material by incising the ear plate and in some cases a large inspissated mass the size of an acorn may be removed. It is the writer's practice to suture the incision, having packed the wound with an antiseptic dressing. It may be necessary to put a circular bandage around the animal's head for one week to prevent reinfection.

Diseases of the Mouth

The tortoise has no teeth, but it is equipped with 2 dental plates at the perimeter of its maxilla and mandible. These have a guillotine action for severing herbage. After hibernation, dried mucus may cause the dental plates to adhere and make it necessary to bathe the mouth to free them. If this process is of long standing, the mucoid material may become infected and degenerate to a caseous yellow material closely adherent to the dental plates and to the buccal mucous membrane. In advanced cases, the infection can affect the dorsum of the tongue and the pharyngeal mucous membrane, and can even be spread to affect intestinal tracts.

In such cases it is necessary to remove all the caseous material, and the writer finds that this is best

carried out using a Graefe's knife and a small surgical curette. Thorough curettage is essential, and should be repeated twice weekly until the condition is cured. Meantime, twice-daily applications of an antibiotic mouth paint with normal saline must be carried out. Many authors refer to this condition as mouth canker, and Noel-Hume refers to the causative organism as a fungus.

Like eye infections and upper respiratory tract infections, mouth canker is frequently associated with inanition secondary to a faulty hibernation, and should be regarded as a symptom of this.

Skeletal Diseases

"*Rickets.*" Little is known about the precise aetiology of a syndrome occurring in tortoises referred to as "rickets." The symptoms are softening of the carapace and plastron so that they can both be depressed readily by the finger and thumb. At the same time, there is loss of bodyweight, and the animal may be unable properly to stand or walk. Radiography of such a case will reveal inferior bone density. It is unlikely that such a case will recover but administration of calcium and vitamin D on a bodyweight basis can be attempted. Noel-Hume states that young tortoises so affected should be offered finely chopped lettuce leaves sprinkled with powdered cuttlefish, and that this should alternate with cod-liver oil. He states, further, that lack of sunlight is often the cause of the condition.

Fractures. Traumatic fracture of the legs occasionally occurs and if the tissue damage is extensive, amputation is usually the best course of action. Precise location of the fracture by radiography is desirable, and immobilisation of the limb, using a matchstick and adhesive plaster, is possible. Frequently, however, spontaneous healing of the fracture will occur but the animal may be somewhat crippled subsequently. Unless the animal is particularly heavy, this need not be a disadvantage with regard to its future locomotion.

Diseases of the Respiratory System

Upper Respiratory Tract Infections

Since costal respiration as seen in mammals does not occur, early observation of upper respiratory tract infections is difficult. Usually the first signs of illness are a clear watery discharge from the nares, perhaps associated with gaping respiration. As the nasal discharge increases, there is a tendency for bubbles of mucus to be blown out of the nostrils. Maintaining the animal in a higher temperature of 75° to 80° F. for a period of a few days is usually sufficient to control this type of infection, and it is necessary only to remove the nasal discharges.

Respiratory Infection

Uncontrolled upper respiratory tract infections frequently descend to the bronchi and lungs, producing a pneumonic illness. The animal breathes stertorously, and may emit a cry with each exhalation. The mouth remains open, and the nasal passages may be blocked with mucus. Laboratory examination of the discharges frequently reveals a pneumococcus. Broad spectrum antibiotics can be injected on a bodyweight basis, and are best administered with hyaluronidase. Increase of living temperature to 80° F. is essential, and steam or friar's balsam inhalations may be of assistance. These can be administered by placing the tortoise in a small wire-based box which is rested on top of a vessel containing hot water and the inhalant. Holmes (1954) reports on the use of sulphanilamide and its success in the treatment of reptilian respiratory diseases, but the writer believes that antibiotic therapy dictated by sensitivity tests is probably much more efficient. Hunt describes the use of silver vitellin in 15 per cent. solution for this condition, and describes how a fine pipette is inserted into the mouth, but adds that wherever possible, and when the size of the external nares allow, it should be instilled as nasal drops. Again, modern injectable drugs are felt to be more effective and less hazardous.

Response to treatment is usually quite slow, and the animal is likely to be affected for 7 to 10 days before recovery occurs. During this time its raised living temperature should be maintained, but forced feeding is contra-indicated. In treating this condition, and many other conditions of tortoises, heat is imperative, but dry heat can lead to dehydration. There should always be a vessel of water nearby to maintain humidity, and bathing the animal twice a day in warm water for 10 minutes or so may be beneficial.

Diseases of the Urinary System

The writer does not believe it possible to diagnose diseases of the urinary system in life, since little of the urinary physiology of this species is known. Khalil and Haggag (1955) have discussed ureotelism and uricotelism in tortoises, but few other workers have investigated this aspect of tortoise metabolism.

Perhaps associated with the urinary system, reptilian gout has been reported by Appleby and Siller (1960).

Diseases of the Intestinal Tract

Diarrhoea. This usually occurs with a surfeit of food, particularly lush food, which may be available to the animal when it comes out of hibernation. It is usually self-limiting, but it is wise always to submit a sample of faeces to a laboratory to check on the presence or otherwise of dysenteric bacilli. Treatment is rational and related to such laboratory reports.

Salmonellosis in tortoises has been reported by several authors, including Boycott, Taylor and Douglas (1953), Douglas and Taylor (1954), Thomas (1957), Zwart and Leeuwenhoek (1960) and Vincent, Neel and Le Minor (1960). In particular, household infections have been described where the infection is passed from the tortoise to children. Fiennes (1961) states that proteus are pathogenic to reptiles though usually non-pathogenic to man.

Constipation. Some tortoises remain constipated after return to activity due to lethargy and inability to exercise. Whilst it is rarely possible to observe straining, cases are sometimes presented with a modest prolapse of the cloaca and sometimes, in the male, of the penis. Lavage of the rectum *via* a

catheter usually produces a satisfactory cure. Such treatment should be followed by the administration of a single dose of medicinal paraffin. One ml. of paraffin is usually sufficient.

Endoparasites. Tortoises, in the main, are little troubled by endoparasitism, but some will pass mature ascarids, whilst others will even vomit them. They are readily removed by administering one of the modern anthelmintics such as a piperazine salt, which is administered on a bodyweight basis as for domestic animals but at half the usual dosage rate. Noel-Hume refers to the use of santonin as an anthelmintic and quotes the dose of 1 grain sprinkled on the food once every 7 days for 6 weeks. The writer believes modern anthelmintics to be more efficient and less dangerous and feels that piperazine salts, if repeated daily for 3 days, will produce a complete eradication. Fiennes reports that newly imported tortoises frequently die as the result of nematode impaction, and the desirability of early anthelmintic treatment is apparent.

Anaesthesia

Local anaesthetics currently in use in veterinary practice seem to be quite suitable for use in tortoises, and do not appear to be toxic. General anaesthesia is rarely necessary, but may be required for the proper reduction of fractures, or for other painful manipulations. In discussing anaesthesia in turtles, Kaplan & Taylor (1957) describe the use of " Nembutal," intracardiac, intravenous and intraperitoneal. They used urethane similarly by stomach tube. Pentobarbitone sodium* was given as a 2 per cent. solution, and urethane was mostly used in 40 to 50 per cent. solutions. Using pentobarbitone sodium the authors state that " Nembutal anaesthesia " was achieved in 30 minutes by the intracardiac route, but persisted longest after intraperitoneal injections. They state that the corneal reflex was always present and as a rule the pupillary diameter remained unchanged.

Anaesthesia was very persistent with urethane and lasted for at least 10 hours.

Kaplan and Taylor also used ether as a general anaesthetic for turtles, and produced deep anaesthesia in about 30 minutes which was maintained for between 6 and 10 hours.

Whilst Kaplan and Taylor's work referred to turtles, it is assumed that their findings could be taken as an indication for anaesthesia of tortoises.

The writer feels that intraperitoneal anaesthesia is simplest and safest: the injection is made ventrolateral to the hind leg and parallel with it, towards the head.

Destruction

Tortoises can be destroyed by injecting 3 to 5 ml. of chloroform subcutaneously under the arm. Like other reptiles they can equally well be destroyed by using nicotine solution placed on a swab and introduced into the mouth. Alternatively Volrath (1961) states :—

" 1. Place the tortoise with its head towards you. There is a soft spot between the head and fore-leg. At this point inject 3 cc. of Euthatal rapidly using a very long but fairly thin needle (2 to 3 in. long, wire gauge 18). Push the needle in hard towards the tail so that it penetrates the thorax. There should be no response to stimulus after 10 minutes. Subsequently decapitate.

" 2. In an emergency draw out the head of a tortoise and cut it off, preferably with bone forceps."

* Nembutal.

General Notes

Injections can readily be carried out by introducing the needle subcutaneously in the fold of skin in the base of the neck and the forearm, or in the groin between the posterior aspect of the femur and the perianal tissue. A spreading agent such as hyaluronidase is advisable.

Oral administration of medicines can be attempted by putting the drug of choice on lettuce leaves, but it is uncertain of acceptance. Furthermore, in view of the fact that tortoises do not drink regularly, and sometimes not at all when plenty of wet vegetation is available, medication of drinking water is valueless.

It is quite simple to pass a stomach tube in a tortoise with its head held out between the thumb and forefinger, and the jaws kept open using a silver probe as a gag. Alternatively, a curved tear-duct catheter is easily introduced into the oesophagus. In this fashion accurate dosage can be achieved. Obviously the usual precautions should be taken to be quite sure that the catheter does not enter the trachea.

In cases of post-hibernation inanition, extra temperature is essential, but it is most important to realise that some moisture exchange of tortoises may be carried out *via* the skin and perhaps the mucous membranes of the mouth and of the rectum. Thus the tortoise can be assisted in such cases by immersing it in warm water (75° F.) and holding it in a vertical position with its head out of the water, for a period of 30 minutes twice daily. Not only will this supply warmth and moisture, but it will encourage the animal to evacuate its bowels. Infra red irradiation as a heat source is excellent, providing humidity is maintained and the animal has access to a shallow bowl of water for drinking and even occasional bathing. No tortoise should be left exposed to infra red irradiation or high temperatures indefinitely.

Breeding. According to Vevers (1959) the eggs are usually laid June to August. In the natural habitat the female digs a hole in the ground into which the eggs are dropped. Each egg is about 1¼ in. long. Eggs laid in captivity should be moved from the pit and laid in a box with shallow sand, taking care to keep them in the same position as when found. They should be covered with an inch of sand and kept at 65° to 70° F. The period of incubation is variable, but is usually about 12 weeks. The newly-hatched young should be kept at 70° F., and fed with chopped lettuce or cooked apple.

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(*Concluded at foot of col. 1 overleaf*)

The Control of Staphylococcal Mastitis

BY

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THE increase in the importance of staphylococcal mastitis since the advent of the antibiotics and the fact that many of these organisms are resistant to penicillin have caused some anxiety to those interested in milk production. This anxiety has expressed itself in a request for information on the most appropriate way to deal with staphylococcal mastitis and it is proposed to publish a shortened version of the following article in the farming press giving details of the recommendations which are considered best to adopt in the light of our existing knowledge of the epidemiology of this type of mastitis.

Staphylococcal mastitis is a contagious disease and like other contagious diseases, it will occur only when sufficiently heavy infection is brought to sufficiently susceptible animals under conditions that will favour the establishment of the infection in the bovine udder.

Control of the disease can be exercised in two ways: (a) by maintaining the cows' resistance to infection and (b) by reducing to the lowest possible level the amount of infection to which the cows are exposed.

Cows vary in their resistance to mastitis infection and the possibility of actively increasing the cows' resistance with vaccines and/or toxoids is still being pursued by workers in several places. Experiments made in recent years hold promise that protection may be induced but further work is needed and at the moment vaccination is not a practical method of controlling staphylococcal mastitis.

It is recognised that while mastitis is predominantly a bacterial infection, it is much influenced by management factors and both aspects will be dealt with in the following paragraphs.

Management Factors Associated with Mastitis

The management factors associated with mastitis have been described in a previous article in THE VETERINARY RECORD (Wilson, 1958) and it is only necessary here to restate briefly the guiding principles and to emphasise the limitations in proof of the part which management plays in influencing the amount of mastitis in a herd. An important point is that cows vary greatly in their susceptibility to mastitis and the organisms invading the udders also differ in their pathogenicity.

This explains why research workers have difficulty in assessing the effect of management factors in mastitis in experimental herds. They must, of necessity, start with a herd which is free from mastitis but the susceptibility of the cow to mastitis cannot be assessed with any accuracy, nor is there any certainty that an organism alleged to be virulent in one herd will continue to be so when introduced into a new environment.

The most important factor to-day in predisposing to mastitis is probably the milking machine and its use, and it will therefore be given most attention. Some reference will, however, first be made to feeding and housing.

Feeding has been blamed for many years as a predisposing cause in mastitis but definite proof is still lacking. It is usually a high-protein diet which is alleged to be responsible and Udall and Johnson (1931) claimed that such feeding exacerbated chronic streptococcal mastitis cases. Frost (1936) could not induce mastitis in experimental cattle by excessive feeding with protein but found that mastitis was increased when this method of feeding was applied in commercial herds where infection already existed.

Stang, Lerche and Nieder (1937) found little difference in the incidence of streptococcal mastitis in three groups of cattle fed on high, medium and low protein diets respectively while Hotis and Woodward (1935) and Moore, Henderson, Van Landingham and Weakley (1942) concluded that feeding had little or no influence either on the incidence or the severity of mastitis.

Nevertheless, it has been noted that the practice of "steaming-up" cattle, if carried to excess, frequently results in mastitis but this could be associated also with the traumatic damage resulting from overstocking.

Housing of cattle can have an effect on mastitis because of the injuries which can occur to the udder in unsuitable stalls. Livoni (1955) has shown that the amount of mastitis increased with the reduction in width of the stalls for the cows. In a temperate country such as ours, cattle are best housed in covered yards where they can lie down in comfort without the danger of a tramped teat or bruised

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udder from being trodden on by a neighbouring cow.

The Use of the Milking Machine. The milking machine is probably the most important factor today in predisposing to mastitis. It is generally accepted that this is so but the proof of this claim has only been imperfectly established. Much remains to be done in deciding what importance to attach to the various parts of the milking machine when considering their effect on mastitis incidence.

Only in so far as *liner design* is concerned has it been possible to prove that mastitis is more prevalent with certain types than with others. Thus Wilson (1952) and Neave, Phillips and Mattick (1952) found a greater incidence of clinical mastitis in herds when they were milked with a low-tension liner with a wide-bore and a hard mouth-piece than when a high-tension, narrow-bore liner with a soft mouthpiece was used. These observations were confirmed by a trial at the National Institute for Research in Dairying by Dodd, Oliver and Neave (1957) as regards to the traumatic effect of the low tension hard mouthed liner on the incidence of clinical mastitis, but they found no difference in the amount of udder infection with the different kinds of liner.

The *vacuum* at which cows are milked has been blamed for some serious outbreaks of mastitis, where, because of a sticking vacuum controller, the vacuum has risen considerably above the normal and the restoration of a normal vacuum has resulted in a spectacular recovery (Leslie & Whittlestone, 1938). However, in controlled experiments Mochrie, Hall, Eaton, Elliott, Plastridge and Beal (1953) could find no difference even in the cell-count from the milk of cows milked at 3 different vacuum levels. Neave, Sharpe, Oliver and Dodd (1961) confirmed this in animals milked at 12.5 inches and 20 inches of Hg. vacuum, by comparing the data from *non-infected* quarters in both groups.

Further experiments are being carried out by workers at the National Institute for Research in Dairying and at Weybridge in commercial herds of 40 to 50 cows. This is a within herd comparison in which half the cows are milked at 13 inches Hg. and the other cows are milked at 20 inches Hg. vacuum and the incidence of mastitis, both clinical and subclinical, in the 2 groups is being compared. The full results of these trials are not available yet but there would appear to be little advantage in milking at a high vacuum since with increasing vacuum there is an increase in the volume of milk required to be removed by machine-stripping. Furthermore, Neave, Sharpe, Oliver and Dodd (1961) showed that milking at a high vacuum (20 inches Hg.) was associated with significantly more teat erosion than occurred in cows milked at 12.5 inches Hg.

A fluctuating vacuum which can be due to various causes but usually to an inefficient pump, has been blamed for a number of serious outbreaks of mastitis which have resolved when the fault has been corrected.

The speed of *pulsation* has not been shown to have any effect on mastitis but workers in New Zealand and America record outbreaks which ensued when, due to a defect, there was complete cessation of pulsation.

The pulsation can be varied by altering the ratio so that the milking phase is longer than the squeeze or resting phase. This results in quicker milking and has not been shown to cause mastitis although mastitis might ensue if due advantage is not taken of the increased milking-speed by a corresponding reduction in the milking time.

Perhaps the most important aspect of machine-milking in its relationship to mastitis is the way in which the machine is used. It is difficult in many cases to state precisely what one man does wrongly and another man correctly so that the former has a mastitis problem and the latter has not. It is not merely a question of speed of milking. It has not yet been shown experimentally that over-milking does produce mastitis although leaving the machines on too long is condemned on other grounds. However, it is true to say that most problems of mastitis in machine-milked herds are associated with over-milking and tend to improve when the clusters are removed as soon as the cow has finished milking. Not every cow milks out in "X" minutes, but an average speed of 10 cows per unit per hour or a production of 15 gallons per unit per hour can be achieved in most herds.

The manner of stripping has probably much to do with mastitis in machine-stripped herds and it is wrong to over-strip a cow to get the last ounce of milk, more especially if frequent massage of the udder is employed.

A common fault in many herds is to employ too many units per man. In a bucket-plant one man can use 2 units and do all the jobs associated with milking apart from carrying the milk but he cannot use any more. If he has a helper to wash the cows, etc., then he can use 3 but that is the maximum number that one man can use in a bucket-plant and be able to get back to each cow before milk has ceased to flow.

In parlour plants the number of units employed per milker will vary according to the design of the parlour and a greater throughput of cows can be achieved but the figure of 10 cows per unit per hour can still be used as a target for milking speed since this will ensure that over-milking does not occur.

Control of Infection

Work at Weybridge on the epidemiology of staphylococcal mastitis (Davidson, 1961) has shown that, although mastitis-producing staphylococci can live and multiply in parts of the cow's body remote from the udder, the most important source of infection is the udder itself. Infections of other sites are less common and, on the whole, less persistent than infections of the udder. These conclusions are supported by Spencer and Lasmanis (1952) who found staphylococci in much greater numbers on the udder than on the flank or vulva and by Rountree, Freeman and Johnston (1956) who failed to find staphylococci in the noses of 2 herds of cows.

As well as infecting the milk-producing tissue of the udder, staphylococci commonly maintain themselves on the skin of the udder and teats. Such skin infections can occur in the absence of visible lesions but they are often associated with the formation of

superficial pustules. Similar lesions are sometimes seen on the skin of the perineum and the under surface of the tail.

Treatment of quarters which are shedding staphylococci in the milk is attended by a rate of success which seldom exceeds 50 per cent. after one course of treatment. Similarly, although clinical recovery usually follows the treatment of mastitis cases, a bacteriological cure is obtained in only about half such cases and in the remainder the cow continues to secrete staphylococci. Furthermore, even in those cases where a bacteriological cure is obtained, the risk of re-infection is high since the staphylococci may have established themselves on the udder skin. For these reasons, precautions against the spread of infection are even more important than they are in controlling organisms such as *Streptococcus agalactiae*, which respond more readily to treatment. Although infection can be transmitted in other ways, it is most commonly carried directly from one udder to another at milking time through the agency of the milking machines, the udder cloths and the milker's hands. Consequently, hygienic precautions at milking time, if properly applied, can have a significant effect in reducing the spread of infection and the amount of mastitis.

The process of milking, in which one attendant using the same set of apparatus milks a large number of cows, is one which is ideally suited to the spread of udder pathogens. It is, of course, impossible to milk each cow with a strictly aseptic technique, but the nearer one approaches this ideal, the more effective will be one's system of control.

The milking machine is the agent which presents the greatest difficulty. The only way in which it can be sterilised within a reasonable time is by steam and this is a method which obviously cannot be applied after each cow is milked. However, other methods, although they do not achieve complete sterility, will remove or destroy a large proportion of the pathogens present. The most efficient of these is the circulation of hot water at 90°C. through the cluster and milk tube for 6 seconds. If this method cannot be adopted, then the best procedure is to flush out the milk tube and cluster with running cold water from a tap for 15 seconds. The traditional method of plunging the teat-cups into a disinfectant solution is less efficient since the disinfectant has little time in which to act, although a proportion of the contamination is removed mechanically. A serious drawback of the method is that some of the contamination is transferred to the outside of the teat-cups and thence to the milker's hands.

Infections of the udder skin can be controlled by adding a suitable antibacterial agent to the udder washing water (Newbould & Barnum, 1958; Davidson, to be published). This reduces the number of staphylococci disseminated from infected udders and reduces the chances of uninfected udders acquiring infection. Prolonged treatment is generally required to remove infection altogether from infected udder skin, but the chances of doing this are improved if udder washing is continued through the dry period. It is essential to use a separate udder cloth or paper towel for each cow since a contaminated cloth cannot be properly disinfected in the time available in the cowshed.

The third agent, the milker's hands, must be dealt with largely by training the milker to regard the cow's udder, milk and anything coming into contact with either of these things as a possible source of infection. He should handle the udder as little as possible, refrain from indulging in excessive massage of the udder when machine-stripping and avoid contaminating his hands with milk.

Recommendations

The following system of control is suggested:—

1. The management factors described in the text, especially those concerned with the machine, should be considered and put right when obvious faults are discovered.
2. Milk mastitis cases and any cows known to be infected last. Treat mastitis cases with an appropriate antibiotic but regard such cases as possible excretors of staphylococci even after clinical recovery.
3. Use a suitable antibacterial agent in the udder-washing water. One cloth or towel per cow.
4. Avoid handling the cows' udders as much as possible. Do not get the hands contaminated with milk.
5. Disinfect the teat-cup cluster and milk tubes, by one of the methods suggested above, after each cow is milked.

If all these measures relating to management and milking hygiene are practised consistently, it can be expected that the amount of mastitis in a herd will gradually decline. Spectacular results are unlikely but the amount of mastitis should be reduced to a low level and kept there. Furthermore, although these measures are especially directed against staphylococcal mastitis, they are likely to be useful in controlling other forms of the disease as well.

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The Poultry Industry and the Veterinary Surgeon

From a Correspondent

DURING the post-war years, and particularly within the last decade, extensive changes have become apparent in the production of crops and livestock. New insight has been gained into genetic selection of various classes of stock, optimal housing characteristics, nutritional and lighting requirements and the diagnosis and control of disease, to consider only a few of the more important contributory factors.

In no class of farming have such vast changes taken place as in the production of poultry for eggs or table birds. Until recently, on the majority of farms, poultry were the responsibility of the farmer's wife and relatively few specialised poultry units existed. Management was mostly under conditions of free range with low concentration of populations, small units, and with scant attention paid to the finer details of productivity or profit. When disease broke out the small size of the units and the scatter of population offered less threat of rapid spread of infection and mortality. In addition, the comparative insignificance of poultry as a productive farm operation tended to make the idea of treating a few birds unacceptable and financially unattractive. It was much more common to wring the affected birds' necks and accept the loss as inevitable.

This attitude towards poultry management and diseases quite naturally caused little emphasis on the pathology and treatment of poultry in the already crowded syllabuses of veterinary schools.

Poultry production has changed fundamentally in the past few years with specialisation of units for egg production, breeding, hatching and the growing of table birds. In addition, there was introduced from the United States the idea of the broiler as a standardised product. To achieve the necessary specialisation the open range system has been modified to bring into being the cage battery or the deep litter house associated with modern egg and table bird production. The battery and the broiler house both bring large numbers of birds together under intensive conditions and in high concentration per unit area of floor space. The production demands on the birds are high, and the breeding, management, nutrition and disease control measures have to be critical. The increased concentration of stock aids the transmission of infectious diseases and any hereditary predispositions to a particular weakness, and lack of productivity or slow maturity may be magnified due to the large numbers of birds involved if genetic selection is not highly specialised.

Installations for intensive production involve high capital expenditure for incubators, houses, food processing plants, packing equipment and machinery. This expenditure has to be justified by a profitable product. Large, integrated commercial groups have created a demand for new types of poultry products such as the packed broiler, deep freeze chickens and joints, which have to some extent changed the housewife's buying habits and if prophets are to be believed this trend will increase.

Thus the poultry producer has become much more a specialised business man with high stakes involved. His economic situation is such that a few pence difference per bird, particularly among the tens of thousands of broilers produced in each unit, can represent hundreds of pounds difference in the net annual income of the undertaking. On a national scale, with an annual broiler crop said to be at about the hundred million level at present, and still expanding, and with a layer and breeding population of about forty-five million birds the value of the industry is now immense.

Changes in poultry production have brought with them changes in the relationship between the producer and the veterinary surgeon. Whereas previously sporadic disease was accepted as a part of rather ill-defined production losses, to-day, when disease appears it is generally a very serious matter. Spread is frequently rapid in the confined spaces available, morbidity and mortality may be high, and tens of thousands of birds may be involved. Losses cannot be overlooked, and the poultryman seeks advice on diagnosis, control and treatment. Not only is it worth the producer's while to seek skilled advice; he cannot afford not to seek such advice from the most reliable sources available. This need for advice is met at present from a number of sources. These include the very valuable services of the Veterinary Investigation Laboratories, laboratories specialising in poultry diseases, specialists employed by large production groups, lay poultry advisers from the Ministry of Agriculture and from various commercial organisations, and others experienced in poultry production.

It is evident, however, that day-to-day advice should be given by the man who lives in the area, who can make himself conversant with local problems and who is trained in the diagnosis and treatment of livestock diseases—that is to say by the veterinary surgeon in general practice. He can carry out this work in co-operation with the diagnostic laboratories and other specialists, and interpret their findings in such a way that they fit in most satisfactorily with the circumstances on his client's farm.

The veterinary surgeon in practice is also in the best position to appreciate the significance of new disease threats which appear among poultry and to advise on their control. Various new types of disease have recently been described in this country or have attained a new significance because of the numbers of birds involved. Many forms of treatment involve "ethical" drugs—those which are limited to distribution by the veterinary surgeon

(*Concluded at foot of col. 1 overleaf*)

Current Literature

REPORT

Madras : Administration Report of the Animal Husbandry Department for the Year 1957-8.

Virtually everything connected in any way with livestock in the large State of Madras is the responsibility of the Animal Husbandry Department—disease control, veterinary public health, livestock development, and veterinary education. The department, which has a large establishment, including 500 to 600 veterinarians, operates through 3 branches—Veterinary, Livestock, and Key Villages—under the over-all command of its Director, Dr. D. Pattabiraman, G.M.V.C., A.I.D.I.

Animal Health. The state was again free of rinderpest. Measures to maintain this fortunate position in a country where the disease is not uncommon include vaccination of imported stock and of cattle along the state borders.

The main cattle diseases are haemorrhagic septicaemia, blackquarter, and anthrax ; to counter them over 1,000,000 vaccinations were made during the year. A further 76,000 sheep and goats were vaccinated against anthrax.

Foot-and-mouth disease was prevalent in all districts, as, also, was surra. Other conditions seen included brucellosis, Johne's disease, ephemeral fever, coccidiosis, nasal schistosomiasis, piroplasmosis, mastitis, and mange. The main diseases of sheep were anthrax, enterotoxaemia and pox.

Rabies was widespread and is known to have killed 165 cattle and 104 dogs. Vaccination of cattle was practised on quite a large scale, but as 25 per cent. of the cattle rabies cases were vaccinated animals its value seems questionable. The type of vaccine used is not stated.

Almost all the sera and vaccines used by the department were produced at the state's Institute of Veterinary Preventive Medicine at Ranipet. During the year the Institute also supplied nearly 3,000,000 doses of freeze-dried tissue rinderpest vaccine to other states as its contribution to the All-India Rinderpest Eradication Campaign.

Veterinary cover was maintained by 113 veterinary hospitals and dispensaries scattered throughout the state, at which about 310,000 clinical cases were treated and 55,000 castrations carried out during the year.

Further assistance to peasant farmers is offered through the medium of itinerant veterinary teams ; the intention is to increase the number of these mobile units.

Animal Husbandry and Livestock Development. Although the veterinary hospitals and dispensaries were originally intended for the treatment of sick animals many of them are now used, in addition, to house pedigree bulls, bucks, and stallions, for service on local stock ; at about a third of the institutions poultry demonstration units have also been established.

Some 2,500 breeding bulls were located over the state under various departmental plans, including artificial insemination and Key Village schemes, for livestock development.

To supply pedigree breeding stock and provide demonstrations of improved husbandry techniques the department maintains a number of livestock farms throughout the state. The main one, at Hosur, carries over 1,000 head of cattle comprising 4 Indian breeds—Sindhi, Hallikar, Gir and Kangayam—as well as 3 Indian breeds of sheep and some European breeds of poultry (White Leghorn, Rhode Island Red, and Black Minorca).

Considerable store is put on the department's extension services for " spreading the gospel " into villages, and particularly on the value of the Key Village scheme. By the year's end 24 Key Village units were in operation.

The department is also responsible for the Madras Veterinary College where a degree course (B.V.Sc.), extending over 4 years and a term, is conducted. The total number of students on the course during the year was 410 ; most were from Madras State and neighbouring Andhra.

One's final impression of this report is that its covers are too far apart. Nearly 260 pages long, it contains much dull and trivial detail that could well have been omitted. Also, some of the figures leave doubt about their accuracy ; for example, that 514 attacks of Ranikhet disease resulted in the death of only 470 poultry. And, in a country where agriculture is the main occupation of the bulk of the people, it is a pity that, in this wealth of statistics, the reader must seek in vain for information on the size of the state's livestock populations. W. E. L.

The Poultry Industry and the Veterinary Surgeon.—*Concluded.*

or upon his prescription—and the correct application of these drugs can only logically and legally be attained by his being concerned with the disease problem from the beginning.

This extension of the veterinary surgeon's work corresponds with that among cattle, pigs and other farm livestock, or among domestic pets. In all cases the general practitioner is the man on the spot and the obvious source of advice. More and more practitioners are finding a place in their practices for poultry work and this represents not only a reasonable interpretation of the responsibilities of the profession to the livestock owning public but a sensible extension of general practice.

Efforts are being made by the B.V.A. and a number of authorities to provide " refresher " courses on poultry problems for the general practitioner and these should enable him to give the best service to the great emergent industry which is summoning him urgently to new fields of endeavour.

The profession must hasten forward to the time when the veterinary surgeon in practice can not only deal with clinical disease in poultry flocks, but also be conversant with general feeding and management methods, production requirements, stock values and so on, thus becoming a confidant and adviser over the whole field of intensive production.

Divisional News

THE CENTRAL VETERINARY SOCIETY

A meeting of the Society was held at the Royal Veterinary College on February 2nd, 1961, by kind permission of the Principal. The President took the Chair at 6 p.m. Nineteen Fellows and 11 visitors attended and apologies for absence were received from 12 Fellows.

Minutes

The Secretary reported that the minutes of the two previous meetings were awaiting submission to THE VETERINARY RECORD.

Membership

Mr. C. R. E. Holman, of Dunstable was elected a Fellow of the Society, and Mr. A. M. R. Nelson, of Bishops Stortford was proposed by Professor McCunn and seconded by Dr. K. Dyce.

Proposed Formation of a Ladies' Guild

The President spoke of this item which had been referred to the Ordinary General Meeting by Council. He asked Fellows to ascertain the opinion of their ladies towards the suggestion that a Ladies' Guild be formed for promoting social activities within the Society, and to communicate their views to the Secretary.

Some Aspects of Salmonellosis

Three distinguished speakers addressed the meeting. Professor R. Lovell introduced the subject by speaking of "The Importance and Recognition of Salmonella Infections in Veterinary Practice." He mentioned the many reservoirs of infection which exist and the increased importance of cattle and calves in this respect. While it is well recognised that salmonellosis as a disease is often associated with, or secondary to, some other predisposing cause, it is often still a mystery why, as St. Matthew says, "one shall be taken and the other left." Professor Lovell went on to discuss the seasonal variation in carrier rates and expressed the view that a very large percentage of animals may act as carriers from one time to another, but that single or occasional faecal sampling would give a far from complete picture.

Dr. Williams Smith gave an account of experimental work designed to test the dangers of feeding to normal pigs, protein supplements heavily contaminated with Salmonellae of a variety of serotypes. The bulk of this work has been published in the December, 1960 issue of *The Journal of Hygiene*.

The third speaker was Dr. N. S. Galbraith, of the Public Health Laboratory Service, Colindale, who described some of the interesting detective work involved in tracking down the origin of infection in 2 outbreaks involving the human population. The source in one case was considered to be calves from a particular holding centre, and in the other, poultry which had been dressed in a cooked meat shop. This work is in the course of publication in *The Lancet* and in *The Journal of Hygiene*.

THE MIDLAND COUNTIES VETERINARY ASSOCIATION

A general meeting of the Association was held at the Feathers Hotel, Ludlow, on February 23rd, 1961, at 2.30 p.m. The President, Mr. T. B. Yarrow, took the Chair, and 20 members and 7 visitors attended. Apologies for absence were received from 35 members.

Minutes

The minutes of the last general meeting held in Shrewsbury on December 2nd, 1960, were taken as read, approved and signed. There were no matters arising.

Correspondence

A letter from B.V.A. Headquarters was read concerning the services given to farmers by sales representatives of commercial firms.

Paper by Dr. R. F. Gordon

The President then introduced Dr. R. F. Gordon, Director of the Houghton Poultry Research Station. His paper was entitled "Poultry Diseases" and referred especially to the broiler industry, the rapid expansion of which had produced several new disease problems. Mr. T. F. Vallely opened the discussion and detailed his experiences of poultry diseases in the Midlands. A general discussion followed, and Mr. J. A. Moss proposed a vote of thanks to the speakers.

Nominations for Election to Council

The following members were nominated for election to Council:—

Mr. S. V. Collard; Mr. E. J. Hodgkinson; Mr. T. F. Vallely; and Mr. A. Steele-Bodger.

Amendments to Rules to Allow Affiliation of Veterinary Clubs

Mr. J. B. Johnston explained to the meeting the reasons for the proposed alteration to the rules, and a lively discussion took place. Mr. Johnston then proposed that the amendments be brought before the next Annual General Meeting for consideration. Mr. J. G. Murray seconded this proposal, which was carried with one dissentient.

Membership

The following names were proposed by the President, and seconded by Major F. Chambers:—

Mr. T. G. Yarrow, of Ludlow; Mr. R. S. Millard, of Ludlow; and Mr. G. S. Reid Chalmers, of Redhill.

Mr. G. F. Kershaw, of Wolverhampton and Mr. A. M. Barker, of Leominster were nominated for membership.

Other Business

Mr. Kershaw mentioned the Poultry Refresher Courses, reminding the members that a course was to be held at Tettenhall on May 1st which would last for 5 days. The Course would be advertised in THE VETERINARY RECORD.

THE SOCIETY OF PRACTISING VETERINARY SURGEONS

A general meeting of the Society was held at the Victoria and Station Hotel, Preston, on Wednesday, September 21st, 1960, at 8 p.m. The President, Captain R. N. Phillips, occupied the Chair, and 18 members and guests were present.

Apologies for absence were received from the following:—

Messrs. J. R. B. Dawson; J. Barber-Lomax; J. M. Ingram; J. Pasfield; O. Swarbrick; A. R. Ayliffe; J. H. Parsons; J. E. Johnson; J. B. White; E. Wilkinson; T. Denham; J. B. Edwards; L. St. Bel-Golledge; Col. G. Bushman, T. Hay; G. C. Powley; S. F. J. Hodgman; and H. F. Hebeler.

Minutes

The minutes of the General Meeting held at Stirling, on April 19th, 1960, having been circulated were agreed and signed as correct.

Membership

Resignations. Mr. D. Easingwood, of Uttoxeter.

Elections. Messrs. D. G. Campbell; A. N. McCormick; A. Whitelaw; J. R. Gregg; R. R. Setterfield; and G. A. Swift.

Nominations. Messrs. W. Corrigall; P. H. Mercer; K. S. Mitchell; J. R. E. Craven; P. D. I. Thomas; P. W. Franks; T. H. Norman; R. R. Henry; J. Forster; T. M. Eaton; R. R. Macrae; H. N. Bateman; A. H. Dawson; F. G. Lawfield; J. Phillips; J. R. Strang; D. J. B. Sutherland; R. J. Low; and R. F. Waterston.

The total membership as at September 21st, 1960 was 568.

British Veterinary Association

(a) A letter from the General Secretary was read out concerning the advisability of introducing short courses of study on the general principles of poultry diseases. Members were requested to notify the Hon. Secretaries (a) whether 1- or 2-day courses should be arranged and if so how, or (b) whether speakers should be selected for Divisional meetings to give talks of a specialised nature assisted by films, slides or other visual aids.

(b) A request was received from the General Secretary for colour or black-and-white photographs of animals in health and in disease to assist in the development of an information service.

Correspondence

A letter was read from the newly formed Association of Veterinary Food Hygienists inviting any member interested in the hygiene of foods of animal origin to join the new Association.

Address by Dr. W. P. Blount

Dr. Blount opened his address on "Poultry and the Practising Veterinary Surgeon" by giving an outline of the poultry industry of to-day, and the degree of specialised knowledge demanded by the industry of its veterinary advisers. In the speaker's opinion, apart from the infectious diseases, about which the farmer could already obtain free advice and laboratory diagnosis, together with access to most of the required medicines, the majority of the veterinary problems associated with poultry-keeping involved detailed knowledge of flock husbandry.

It was generally agreed that it was sound policy for the veterinary surgeon in practice both to display an intelligent interest in and assist his farmer clients with their poultry problems.

Dr. Blount then proceeded to demonstrate his *post-mortem* technique on specimens obtained both locally and from members of the audience. In view of the smallness of the audience each specimen was examined in detail, a diagnosis made and any questions answered. The salient points regarding symptoms, epidemiology, pathology and treatment (if any) of the various conditions were emphasised by Dr. Blount with such pithy, humourous comments that his audience were unlikely to forget them. The speaker concluded his demonstration with specimens showing experimentally-produced "X" Disease in turkey poults and gave a brief summary of the present knowledge of this disease.

Having thanked Dr. Blount for his interesting address and apologised for the paucity of the audience, the President declared the meeting open for general discussion. A wide variety of questions ranging from the use of fowl-pox vaccine to the relative merits of battery and free-range eggs in the baking of cakes were answered or parried by Dr. Blount.

News and Comment

R.C.V.S. CELEBRATION DINNER

The Council of the Royal College gave a dinner at the Savoy Hotel last Monday evening in honour of the President, Sir John Ritchie, C.B., and to celebrate the eradication of bovine tuberculosis in Great Britain. The Council were honoured by the presence of the Minister of Agriculture, and a number of other Members of Parliament including Mr. W. M. F. Vane, M.P., Mr. Geoffrey de Freitas, M.P., Sir James Henderson-Stewart, M.P., Sir John Maitland, M.P., Dr. R. Bennett, M.P., and Mr. F. Peart, M.P.. It had been the Council's aim that their guests should represent a cross-section of the profession, including members in private practice, teachers, research workers, and members of the Animal Health Division, together with prominent agriculturalists, and others directly concerned with the profession's work, in particular with the successful eradication scheme. It had been said that were such a thing possible this should have been a dinner party at which the whole profession was present in order to celebrate one of the greatest triumphs in its annals.

Mr. G. N. Gould, Senior Vice-President, presided, and among guests of note were Mr. Sydney Jennings, President of the British Veterinary Association, Sir John Winnifrith, Sir Thomas Dalling, Sir Laurence Watkinson, Dr. A. W. Stableforth, Mr. Salter Chalker, Mr. L. Guy Anderson (President-elect) and Mrs. Anderson.

Mr. Gould having welcomed the company invited the Minister of Agriculture to propose the toast to Sir John Ritchie (who was accompanied by Lady Ritchie) after which Sir John replied.

It is intended to give a full account of this important and highly successful dinner party in our next issue. The Easter week-end has obliged us to go

to press early, thus preventing us from doing the occasion full justice this week.

CARLSBERG-WELLCOME TRAVELLING RESEARCH FELLOWSHIPS

Applications are invited for the Carlsberg-Wellcome Travelling Research Fellowships, 1961-62, the objects of which are to encourage co-operation, on an exchange basis, between Danish and British research workers in any branch of the natural sciences which has a bearing upon human and animal medicine. One Fellowship annually is awarded to a candidate from the United Kingdom for a year's work in Denmark and one annually to a Danish candidate for a year's work in the United Kingdom. The stipend may range from £900 to £1,300 per annum (or the equivalent sums in Danish kroner), travelling and some incidental expenses being provided in addition. The tenure of the awards will start in September, 1961.

Enquiries from candidates in the United Kingdom should be addressed to the Assistant Scientific Secretary of the Wellcome Trust, 52, Queen Anne Street, London, W.1, from whom further particulars may be obtained. Completed applications must be submitted before April 30th.

OPEN DAY FOR VETERINARY SURGEONS

An open day for veterinary surgeons was held by British Oil and Cake Mills Ltd., at their Barlby Farm, Selby, testing station on Tuesday, March 21st. Visitors were shown the pig demonstration unit, intended as a practical demonstration of the costs involved in the rearing of weaners and of pork, bacon, and heavy, pigs under conditions of intensive management. Something was seen also of the sow and litter testing which has been carried on at the farm since 1952. A discussion was held on "Pig Problems" under the chairmanship of Mr. R. B. Little, B.SC., N.D.A., and the panel of speakers included Mr. M. W. Maclean, B.SC., M.R.C.V.S., of Selby.

Fifty-seven members of the profession accepted invitations to be present during the day.

THE NUTRITION SOCIETY

The Nutrition Society (Scottish Group) will hold a symposium in the Physiology Lecture Theatre, Queen's College, Dundee, Angus, on Saturday, April 22nd, at 1.30 p.m. The subject will be *The relative values of animal and vegetable fats in nutrition.*

The chairman will be Professor A. C. Frazer (Department of Medical Biochemistry and Pharmacology, University of Birmingham) and the following contributions have been arranged:—

Dr. R. P. Cook (Department of Biochemistry, Queen's College, Dundee) "The biochemistry and metabolism of fats"; Dr. A. Crossley (Unilever Ltd., Port Sunlight) "The chemistry of the animal and vegetable fats in relation to their utilisation and industrial processing"; Dr. H. M. Sinclair (Magdalen College, Oxford) "Animal and vegetable fats as human foods"; Dr. E. Aes-Jörgensen (Polytechnic Institute, Copenhagen) "Hydrogenated oils and polyunsaturated fatty acid isomers in nutrition"; Dr. W. G. Siller and Dr. W. Bolton (Poultry Research Centre, Edinburgh) "Fats and atherosclerosis in fowls," and Dr. M. F. Oliver (Royal Infirmary, Edinburgh) "Lipids and coronary heart disease—therapeutic aspects."

Further particulars may be obtained from the hon. secretary of the Scottish Group of the Nutrition Society, Dr. J. Davidson, The Rowett Research Institute, Bucksburn, Aberdeen.

UNIVERSITY NEWS

Edinburgh

The undermentioned candidates have passed in the subject of Physics of the First Professional Examination for the degree of Bachelor of Veterinary Medicine and Surgery:—

Barnes, Peter; Boulcott, Stella R.; Burns, Patrick; Callaghan, David; Cheung Chin Yan, Cheung S. S.; Crosbie, Andrew P.; Dixon, Francis W.; Drake, Anthony F.; Eaton, Peter; Galloway, Fiona H.; Gordon, Roger; Hamilton, Doreen E.; Hayles, Launcelott B.; Hothersall, Dennis; Jackson, Michael R.; Jaggar, David H.; Jennings, David S.; Kennedy, Judith; Leslie, Fiona M. R.; Loughran, Margaret J.; McDowell, James A.; Millar, Eric H.; Muriithi, Ishmael E.; Musa, Samuel; Orr, James P.; Parkin, Geoffrey D.; Richardson, Robin M.; Ross, Gairn A.; Schubert, Frederick K.; Scott, Robert J.; Taylor, Andrew S.; Thomson, John; Tudge, Graham E.; Wardrop, Patricia M.; and Ware, James S.

The undermentioned candidates have passed the Second Professional Examination in the subjects of Veterinary Anatomy and Histology and Veterinary Physiology and Biochemistry for the B.V.M. & S. degree:—

Alexander, Richard John; Breton, Derek Arthur George; Horne, Ann Margaret; Little, Thomas William Anthony; and MacDonald, William Ian.

The undermentioned candidates have passed in the subject of Veterinary Physiology and Biochemistry of the Second Professional Examination for the B.V.M. & S. degree:—

Hall, Paul Guy; and Holland, Roy Eric.

The undermentioned candidates have passed the Third Professional Examination (Part II) in the subjects of Veterinary Pathology, Bacteriology and Parasitology for the B.V.M. & S. degree:—

Brown, Byron J.; Carthcart, Hugh A. A.; Clark, William A.; Copland, Alexander N.; Forbes, Anne; Forrest, Dougal T. M.; Foster, William N. M.; Frankland Anthony L.; Grant, Donald G. A.; Grave, Jill B.; Gribbin, Henry J.; Hill, Michael R.; Jones, Alfred G.; Kelly, James M.; Linklater, Karl A.; Linscott, Thomas B.; Loughery, Samuel; Taylor, William P.; Thompson, Robert S.; Waters, Richard J.; Whaley, Francis H.; Williamson, Alexander M.; and Wrathall, Anthony E.

The undermentioned candidates have passed in the subject of Veterinary Obstetrics of the Final Professional Examination (Part II) for the degree of Bachelor of Veterinary Medicine and Surgery:—

Anderson, Euan C.; Arbuckle, James B. R.; Bailey, Sheila A.; Bell, Alastair F.; Blake, George; Broome, Brenda M.; Bulley, Frank R. T.; Carwardine, Paul C.; Cooper, Michael J.; Coulthwaite, John R.; Davies, Charles S.; Davies, Lewis D.; Foggie, Janet; Forbes, Derek; Fraser, Thomas W.; Glickman, Murray A.; Haigh, Arthur J. B.; Hargreaves, Charles E.; Hoskin, Brian D.; Kirkham, John; Lander, Keith P.; MacIntyre, Gerald C.; McNab, Ian; Marsh, Ian A.; Meldrum, Keith C.; Mighell, John S.; Muirhead Michael R.; Paterson, Robin J.; Pearson, Clifford; Pearson, Michael V. M.; Reece, Peter; Rodger, John O. K.; Sansi, Kamoru A. O. O.; Stewart, Colin G.; Sutherland, Stewart D.; Wilson, Michael; and Young, Godfrey F.

The undermentioned candidates have passed in the subject of Veterinary Pathology of the Third Professional Examination (Part II) for the B.V.M. & S. degree:—

Doe, Ian; Martin, Ronald N.; Ross, Ian C.; Sargeant, John P.; Stewart, Hugh D.; and Taylor, David R.

The undermentioned candidates have passed in the subject of Veterinary Bacteriology of the Third Professional Examination (Part II) for the B.V.M. & S. degree:—

Doe, Ian; Ferguson, Kenneth, R. C.; Forgrave, Bryan T. G.; and Scott, Margaret A. B.

The undermentioned candidates have passed in the subject of Veterinary Parasitology of the Third Professional Examination (Part II) for the B.V.M. & S. degree:—

Ferguson, Kenneth R. C.; Forgrave, Bryan T. G.; Scott, Margaret A. B.; Somerville, James C.; and Taylor, David R.

DR. D. LUKE

As we go to press we learn, with great regret, of the sudden death of Dr. D. Luke which took place last Monday. He was on the staff of The Veterinary Research Division of the Ministry in Stormont, Belfast. Dr. Luke qualified at Edinburgh in 1938.

It is hoped to publish a memoir in the near future.

PERSONAL

Births

CRAIG.—On March 23rd, 1961, to Barbara (*née* Penhale, M.R.C.V.S.), wife of William A. Craig, M.R.C.V.S., Mansewood House, Morningside Park, Edinburgh, 10, a daughter, sister for Douglas.

GABB.—On March 19th, 1961, to Eileen and Kenneth Gabb, M.R.C.V.S., 28 High Street, Lowestoft, Suffolk, a daughter, Gillian Carole.

WHITTLESTONE.—On February 17th, 1961, to Inga, wife of Peter Whittlestone, M.A., PH.D., B.SC., M.R.C.V.S., a son, Michael, brother for Ann.

Engagements

HOYLES—SWANN.—The engagement is announced between John, elder son of Mr. and Mrs. G. H. Hoyles, of Monmouth House, Long Sutton, Lincs., and Deborah, elder daughter of Mr. H. C. Swann, M.R.C.V.S., and Mrs. Swann, of White House, King's Lynn, Norfolk.

WOODWARD—AVIS.—The engagement is announced between Brian G. Woodward, B.VET.MED., M.R.C.V.S., only son of the late Mr. G. F. J. Woodward and Mrs. Woodward, of Edgware, Middlesex, and Christina Avis, elder daughter of Mr. and Mrs. G. H. Avis, of Hammersmith, London.

COMING EVENTS

April

4th (Tues.). SOCIETY OF PRACTISING VETERINARY SURGEONS. Meeting in the Northern Hotel, Kittybrewster, Aberdeen, 2.30 p.m.

6th (Thurs.). NORTH WILTS. VETERINARY CLUB. Meeting at the Goddard Arms Hotel, Swindon, 7.45 p.m.

7th (Fri.). BRITISH VETERINARY POULTRY ASSOCIATION. Symposium on "The Education of Veterinary Students in Poultry Disease" at the Royal Veterinary College, London, W.1, 11 a.m.

LANCASHIRE VETERINARY ASSOCIATION. Meeting at the Midland Hotel, Manchester, 7.30 p.m.

8th (Sat.). B.R.X. CLUB. 15th Annual Dinner at the Royal Veterinary College, Camden Town, N.W.1, 6 for 7 p.m.

11th to 13th (Tues. to Thurs.). ASSOCIATION OF VETERINARY TEACHERS AND RESEARCH WORKERS. Annual Conference in the Imperial Hotel, North Promenade, Blackpool, 9.30 a.m.

12th (Wed.). SUSSEX VETERINARY SOCIETY. Meeting at the Old Ship Hotel, Brighton, 2.30 p.m.

MIDLAND COUNTIES VETERINARY ASSOCIATION. Joint Meeting with the Staffs. and Derbys. Veterinary Club at the White Hart Hotel, Uttoxeter, 7.30 p.m.

14th (Fri.). YORKSHIRE VETERINARY SOCIETY. Annual Buffet Dance at the Parkway Hotel, Otley Road, Leeds, 8 p.m.

28th (Fri.). LIVERPOOL UNIVERSITY VETERINARY SOCIETY. First Annual Dinner at Reece's Restaurant, 7.30 p.m. for 8 p.m.

29th (Sat.). ASSOCIATION OF STATE VETERINARY OFFICERS. Annual General Meeting in Kent Room, Caxton Hall, London, S.W.1, 4 p.m. Dinner at the Criterion, Piccadilly, 6.30 p.m.

September

3rd to 9th (Sun. to Sat.). 79th Annual Congress of the British Veterinary Association at Oxford.

MEETINGS OF B.V.A. STANDING COMMITTEES AND COUNCIL

At the Royal Dick School of Veterinary Studies, Edinburgh

Wednesday, April 5th

Veterinary State Medicine Committee. 10 a.m.
Small Animals Committee. Noon.
Farm Livestock Committee. 3 p.m.

Thursday, April 6th

Parliamentary and Public Relations Committee. 10.30 a.m.
Home Appointments Committee. 11.45 a.m.
General Purposes and Finance Committee. 2.15 p.m.

Friday, April 7th

Council Meeting. 10 a.m.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Lanark. Bogside Farm, Ashgill, Larkhall (Mar. 23).
Yorks. Foxup Bridge Farm, Litton, Skipton (Mar. 23).

Foot-and-Mouth Disease

Devon. Wellsley Farm, Bishops Tawton (Mar. 23).

Fowl Pest

Glos. The Shielings, Ledbury Crescent, Staunton (Mar. 21).

Herts. Pear Tree House, Wilstone, Tring (Mar. 23).
Lancs. Brooklands, March Lane, Longton, Preston; Blackhurst Farm, Marsh Lane, Longton (Mar. 21); Highfield, House Farm, Higher Wheelton (Mar. 22); Greenacres, Moss Lane, St. Michaels, Preston (Mar. 23).
Lincs. Grass Plant Unit, Belvoir, Grantham; Riding School, Belvoir, Grantham; Belton Estate, Grantham; The Mill, Sutterton, Boston (Mar. 22).
Norfolk. Oak Farm, North Tuddenham, East Dereham (Mar. 21).
Northants. Chapel Farm, Ashton, Oundle, Peterborough (Mar. 22).
Notts. Belvoir Farm, Redmile (Mar. 21); Calcrofts Farm, Redmile; Normanton Aerodrome, Normanton (Mar. 22).
Surrey. Beautility Poultry Farm, Whidlesham Road, Chopham (Mar. 23).

Swine Fever

Glam. Tygwyn Farm, Clydach, Swansea (Mar. 22).
Lancs. Haworth Fold Farm, Burnley (Mar. 21).
Norfolk. Malthouse Farm, Fritton, Long Stratton, Norwich (Mar. 23).
Suffolk. Golden Farm, Farley Green, Wickhambrook, Newmarket (Mar. 23).
Warwicks. Birmingham Road Allotments, Stratford-upon-Avon (Mar. 22).
Worcs. Hazeldene, Holt Heath (Mar. 21).
Yorks. Moorside Piggeries, Moorside Lane, Oxenhope; The Bungalow, Dunswell Road, Cottingham; Hagg Lane, East Cottingwith; Marshall Hill Farm, Scissett, Huddersfield; Piggeries, Richgarth, West End, Epworth, Doncaster (Mar. 22); Longlands Farm, Hornby, Great Smeaton, Northallerton; Bracon Cottage, Belton, Doncaster (Mar. 23).

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

An Unexplained Condition in Pregnant Ewes

Sir,—With your permission I think it might be of interest to record a brief summary of the replies which I received to my letter of March 18th.

I have so far received letters from 7 veterinary surgeons in widely separated parts of the country, all of whom have seen ewes which have died with a prolapse of intestine through a tear in the vaginal wall.

In almost all cases the ewes have been of a large breed, of mature age, carrying a twin. They have almost all been fed on a bulky diet of kale, swedes or turnips and the mishap has occurred about a week to a fortnight before lambing. All the histories suggest that the condition happens quite suddenly; the ewe lying down commences to strain and the intestine appears very quickly. In most instances she does not rise again but dies in from 20 to 30 minutes.

It is, perhaps, significant that while this has been becoming more common there has also been a marked increase in the number of cases of prolapsed vagina.

It is by now quite clear that these cases are not due to sadism, a conclusion which may be of importance to the veterinary surgeon who meets a single case and who is bound to consider this possibility.

Since writing on March 18th we have had several more cases in the practice both on the farms mentioned and on other farms. I am most grateful to those veterinary surgeons who have written, giving me the benefit of their experience.

49 Endless Street, Salisbury. Yours faithfully,
J. B. WHITE.
March 27th, 1961.

Sir,—I would like to add to Mr. J. B. White's interesting letter in THE VETERINARY RECORD of March 18th.

We in this practice have had a very large number of cases of ewes showing pre-parturient cervical prolapse. I believe this is the case in neighbouring practices.

One client had not experienced this condition until 2 weeks ago. It was treated by retrieving the prolapse and suturing the vulval lips together with the administration of antibiotics. This ewe died within 24 hours, but no further investigation was made as it was thought to be an isolated case.

However, a few days later I was called out, by the same client, to a ewe in the process of lambing with a prolapsed cervix. On examination it was found that the ewe had prolapsed its cervix and the 2 forefeet of a foetus were showing through the exposed vaginal wall. Two dead lambs were easily drawn through the vaginal and uterine walls. *Ante-mortem* examination suggested a tear of some 5 to 6 inches in length.

This condition was thought to be due to a "ring-womb" condition with an active foetus tearing the uterus with its feet, the continued uterine pressure pushing the foetus and extending the tear.

Two days after this case I was called by the same farmer to yet another ewe with a prolapsed cervix. On arrival at the farm the ewe was found to be dead with most of its intestines showing through a large vaginal tear. There was an interval of only 2 hours between the mid-morning flock examination, when all the ewes seemed quite normal, and the farmer telephoning for help: a further half-hour elapsed before my arrival on the farm.

On *post-mortem* examination the peritoneal cavity was found to be filled with a fresh blood clot and the vaginal wall was torn from vulva to cervix. There was no udder development to indicate imminent parturition, in fact the twin foetuses seemed to be about a fortnight off term.

Yours faithfully,
63 Monnow Street, Monmouth. R. SCOTT CAMERON.
March 21st 1961.

Local Reaction to the Injection of Methyridine

Sir,—The report by Scarnell (1961) of local reactions in ponies injected subcutaneously with methyridine* is of interest as it supports experimental evidence that a species variation to injections of this substance exists.

Our studies on the local reaction to methyridine (which are to be published fully) were confined to

* "Promintic": I.C.I.

rats, sheep and cattle. Of these 3 species the most severe changes occurred in the rat, with skin ulceration as a constant feature. Injection sites from sheep and cattle dosed at 200 mg. per kg. were examined histologically at intervals up to 32 days after administration of the drug. Tissue irritation occurs in sheep and cattle and is characterised by oedema with some focal necrosis of the subcutaneous connective tissue and superficial skeletal muscle 24 hours after injection. By one week after administration healing of the damaged connective tissue is well advanced.

The occurrence of local necrosis of tissue is not infrequent following the injection of water-soluble drugs (Paget, 1957) and does not by itself contra-indicate the use of the drug in question. The value of such drugs must be judged by clinical experience and in the case of methyridine used in sheep and cattle this appears to be almost wholly favourable (Groves, 1961; Hamilton, 1961).

There is no evidence from our laboratory studies or the field trials undertaken with the substance in cattle and sheep to support the conjecture by Scarnell that when used with proper care the incidence of Clostridial infection in cattle is enhanced.

We have not studied the therapeutic or toxic properties of methyridine in horses at all, and reports on the result of its administration to horses are of interest. From such investigations the utility of methyridine for equine practice can be determined and appropriate recommendations made.

Yours faithfully,
E. THORPE.

Imperial Chemical Industries Ltd.,
Pharmaceuticals Division,
Alderley Park,
Nr. Macclesfield,
Cheshire.
March 24th, 1961.

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A Practical Memorial to Mr. A. B. MacIntyre

Sir,—In your issue of February 18th you kindly published a letter suggesting a practical memorial to the late Archie MacIntyre in the form of donations to the Victoria Veterinary Benevolent Fund. I have just heard from Mr. Francis that the response to date is £49 6s. 0d. In making this appeal I had in mind that there were approximately 5,000 of my colleagues who could subscribe a minimum of 10 shillings without in any way embarrassing themselves or their families. This miserable response is very disappointing in view of all the help and assistance Archie MacIntyre so freely gave to one and all, so I am encroaching on your space to jolt further the conscience of my fellow members.

Perhaps we are divided into 2 main groups. The first those who, like myself, read THE RECORD in bed and the following morning have either forgotten what we have read or are too busy to do anything about it. To these I make a further appeal—put that 10s. note into an envelope and address it to Mr. C. W. Francis, Archie MacIntyre Memorial Fund, College House, Wright's Lane, London, W.8, and then go about your day with a special halo, for the 24 hours at least.

As to the other, and I trust, minority group, whom I assume are members of that well known club, the Christian name of which eludes me for the moment, may I remind them that any monies subscribed are solely used for the assistance of our less fortunate brethren and their families? As this second group ruminate in their present prosperity and reflect on their club motto, I would remind them no one knows what lies around the corner and there is another equally well known saying "There, but for the grace of God . . . ."

Yours faithfully,
HARRY S. GATES.

102 Brighton Road,
Purley,
Surrey.
March 22nd, 1961.

Administering Medicine to Small Birds

Sir,—Those veterinary surgeons who, like myself, are called upon to attend the diseases of small seed-eating birds, are frequently at a loss to know the best method of administering medicine to the patient. Some will subscribe to premedication of drinking water—a system which depends entirely on the bird drinking sufficient of the medicated water to obtain a reasonable dose of the medicament. Sometimes the colour or perhaps smell of the medicated drinking water is sufficient to prevent the bird drinking at all. Other clinicians favour dusting the seed with medicament. Whilst those birds that eat whole seed might accept small quantities of such seed, dehusking birds such as budgerigars, are bound to discard the bulk of the therapeutic agent by the mechanical removal of the husk.

Of course, if the bird is co-operative and the owner patient, oral medication *via* a dropper is sometimes possible. Administration of medicaments by injection is also possible, but when repeated frequently is likely to be distressing to the bird and expensive to the owner.

With all these difficulties in mind I had the opportunity of discussing the problem in its widest terms with the Laboratories for Applied Biology Ltd. As a result of these discussions, a technique has been perfected whereby canariensis seed kernel is impregnated with medicament at a known concentration per gramme of seed*. Subsequent dehusking of the seed does not, therefore, interfere with the therapeutic value of the seed.

From my own experience, acceptance of medicated seed is good, providing the bird is hungry, and the medicated seed is offered before alternative food. I am informed that the medicated seed is now available containing either chloramphenicol, penicillin, sulphonamide or vitamin B_{12}. My experience with the seed shows that many bacterial infections of small seed-eating birds can be controlled by its use

* "Ornimed" seed (Lab. of Applied Biology).

and that a debilitated bird benefits by eating the seed impregnated with vitamin B_{12}.

I view this form of therapy as a great improvement upon previous methods of administering therapeutic agents to small birds.

Yours faithfully,
OLIVER GRAHAM-JONES,
Veterinary Officer.

The Zoological Society of London,
Regent's Park,
London, N.W.1.
March 22nd, 1961.

Electrical Anaesthesia

Sir,—A recent paper in the *Journal of the American Medical Association* (Hardy *et al.*, 1961) has described the use of electrical anaesthesia for major surgery in human beings. The preliminary work was carried out on dogs (Knutson *et al.*, 1956), and comment in both the American journal and *The Times* (March 17th, 1961) has been very favourable and has pointed out that this form of anaesthesia might be very suitable for field conditions where little skilled help is available. In view of these facts it would seem that the procedure might have veterinary applications. I feel that any veterinary surgeon who might contemplate the use of electrical anaesthesia should be aware of all the information at present available on this subject, since, inevitably, no dog can communicate directly its experiences.

Knutson *et al.* (1956) recounted the experiences of five human subjects anaesthetised electrically. One of them "seemed to be awake but made no movement" and was, presumably, in a state of electrical curarisation, a condition which must always be a hazard in any attempt to produce unconsciousness in animals by electrical means. This same patient later described his experience as "unpleasant—like burning in Hell"; another patient said that the experience had been "an unpleasant one." Comment in *The British Medical Journal* (February 25th, 1961) states that there may be "a feeling of impending dissolution" before narcosis occurs, and that "permanent damage to the brain" may occur, while "permanent damage to the personality cannot be ruled out."

While it is obviously incorrect to ascribe to animals the full range of human experience, I feel that, as veterinary surgeons, we have a duty to consider the experiences of human beings when we are about to use new techniques, just because we cannot get comparable information from our own patients. The paper by Knutson *et al.* is, incidentally, full of other useful information such as the changes in the cardio-vascular system and in blood chemistry during electro-narcosis.

Yours faithfully,
PHYLLIS G. CROFT.

The Universities Federation for Animal Welfare,
7A Lamb's Conduit Passage,
London, W.C.1.
March 23rd, 1961.

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KNUTSON, R. C., *et al.* (1956). *Anesthesiology*. **17**. 815.

Paraffin-coated Syringes and Blood Sampling

Sir,—At the onset, may we say that no credit at all is to be attributed to us for this technique. It is apparently universally known and used amongst laboratory workers, but this does not seem to be the case amongst practising veterinary surgeons. We wish we had known of it when in practice.

This simple technique makes the taking of blood samples (particularly from dogs and cats) considerably easier. The inside surfaces of the dry syringe are coated with the thinnest possible film of sterile liquid paraffin; in syringes that have been sterilised by boiling this is easily done by just touching the end of the plunger in the surface of the liquid paraffin and spreading the film by movements of the plunger within the syringe. Syringes which are autoclaved or sterilised by hot air may be coated before sterilisation. It is important that a minimum volume of paraffin be used to avoid alteration of the character of the blood. This procedure prevents contact of the blood with the inside of the syringe, retards clotting while the sample is being taken, and eliminates jamming of the plunger on expulsion of the sample.

Yours faithfully,
JANE SPRANGER,
J. M. HIME.

Canine Health Centre,
Kennett,
Nr. Newmarket,
Suffolk.
March 21st, 1961.

The Control of Newcastle Disease in Switzerland

Sir,—The following note is based on two papers by Hess (1958 and 1960), and may be of interest to your readers.

Since 1947 a prohibition on the importation of live poultry into Switzerland has been in force, and imports of frozen chicken are examined for fowl pest virus by random sampling, with the result that no further sources of the disease have appeared since then.

Thirty carcases are taken from each 5 tons of a shipment, and the spinal cord is removed from the neck stump. After preparation this material is injected into experimental chickens. Over a series of 224 tests, 156 samples were positive, of which 97 per cent. were detected by animal inoculation, but only 37 per cent. by egg inoculation. A total of 3,178 tests have been carried out on 20,000 tons of which 2,000 tons (266 consignments) were affected.

The introduction of this examination led to a dramatic fall in the incidence of Newcastle disease, from 377 cases in 1947 to 31 cases in 1948. In Switzerland inoculation with live or dead virus vaccines is prohibited, and total slaughter is carried out immediately on confirmation of a sporadic outbreak (with partial compensation).

Yours faithfully,
L. A. HEMSLEY.

c/o 312, Lower Addiscombe Road,
Croydon,
Surrey.
March 21st, 1961.

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